

Estimating the determinants of executive selection in multinational companies: A two-sided matching model

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Abstract:

Using a unique dataset on subsidiary executive appointments in multinational banks and a competitive assignment matching model, this study investigates executive selection in the international labour market. The international context is characterised by heterogeneous firms with varied human capital needs, allowing for a nuanced examination of the determinants of executive selection along multiple human capital dimensions, with a particular emphasis on firm-specific versus general human capital. The study explores (i) the determinants of executive selection in MNC subsidiaries, (ii) how these determinants shift relative to economic conditions, and (iii) how they differ for two types of functional roles. I find that the relationship between human capital and the firm's resource base is largely complementary; however, firm-specific human capital is the dominant determinant of executive selection during an economic upswing, but during an economic downturn firm-specific human capital is nearly four times weaker in driving selection than general human capital.

Keywords: executive selection | competitive assignment matching model | international labour markets | strategic human capital | general human capital | firm-specific human capital | MNCs | multinational corporations | foreign subsidiaries

Article:

1 Introduction

An important question for managers and management scholars alike is how firms select the right workers. As a production input, human capital has an unrivalled impact on firm performance. However, finding the right fit between workers and firms is non-trivial. Not only do human capital attributes differ between individuals, but the value of human capital can differ dramatically between firms (Lazear and Oyer, 2012; Campbell et al., 2012). In other words, the value of a worker to a firm depends not only on his or her abilities but also on the quality of the match between the firm and the worker's human capital attributes.

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Despite the importance of job matching and despite its ubiquity in organisational life, the personnel economics literature and the literature on strategic human capital continue to debate how the matching process takes place. What are the determinants of a job match? Which mechanisms underlie the matching process? In particular, it is unclear whether an efficient job match arises from aligning firm attributes to idiosyncratic combinations of general human capital, to on-the-job firm-specific experience, or whether it arises from a mix of both (Lazear, 2009). Finally, how do matching patterns change between economic upswings and downturns, and are they consistent between functional roles?

To inform research on selection and matching, I examined the international labour market and executive selection processes in multinational corporations' (MNCs) foreign subsidiaries. The international context is comprised of heterogeneous firms with varied human capital needs, and provides a rich research setting for studying the determinants of executive–firm matches. Using a competitive assignment matching model, I estimated the drivers of efficient job matching by modelling how executives with different skillsets partner with MNC subsidiaries, and examined how the joint preferences of executives and firms change depending on economic conditions.

By applying the logic of a two-sided competitive assignment game (Shapley and Shubik, 1971) to the process of executive selection, my study addresses a limitation of previous research. The assignment of executives to firms is endogenously determined, meaning that both executives and firms choose their partners strategically and interdependently given rival options in the labour market. Since executive selection by firms is (i) non-random and is (ii) likely to be influenced by unobservable variables, using classical regression frameworks is problematic and can lead to biased results (Chatain and Mindruta, 2017). One such unobservable variable, which is arguably a key component of the executive selection process, is the availability of human capital in the labour market, and its exclusion can bias the results obtained using regression models.

The two-sided matching approach compares observed executive–firm matches relative to all other counterfactual matches that could have occurred in the labour market, but did not. This method thereby explicitly accounts for the availability of human capital in the labour market. The counterfactual partnerships between executives and firms represent the set of relevant potential candidates available to firms in the labour market and, conversely, the set of employers seeking to fill executive positions. The empirical estimation strategy uses the assumption that the labour market is in a pairwise stable equilibrium where neither executives nor firms would gain from forming a counterfactual match. I exploited the constraint that observed matches produce higher productivity for both partners than any possible counterfactual executive–firm pairing to estimate the parameters of interest. Solving a matching model with many agents is not trivial because the observed solution must hold compared against all possible counterfactual partnerships, otherwise an agent would have incentive to deviate from his or her equilibrium match. Following Fox (2010b), I used a maximum score estimation strategy to estimate a local production maximisation condition, and optimised the multinomial model using the differential evolution method.

I applied this method to a self-collected database of 2063 matches between MNC subsidiaries and top management team executives, of which 1068 have complete information on all firm and

executive attributes of interest. The study sample included 75 subsidiaries of 33 US and European banks located in 12 Central & Eastern European countries during 2005–2010.

In addition to highlighting the determinants of an executive–subsidiary job match, I studied the relative weights that various types of MNCs place on firm-specific human capital versus different kinds of general human capital. Because general human capital can itself differ in its “generality”, I examined how MNCs weigh firm-specific human capital relative to the following types of general human capital: education, international experience, relevant regional experience, and relevant country-specific experience, listed here from most general to more specific. Finally, I examined how the determinants of a job match change between periods of economic growth and economic decline. This study contributes to human capital theory (Becker, 1964) and research on strategic human capital (Campbell et al., 2012). The results lend empirical support to the strategic human capital view, which argues that firms benefit from both firm-specific and general human capital; however, the use value of general human capital varies with the goodness of fit between firm resources and workers’ idiosyncratic endowment of widely-applicable skills (Campbell et al., 2012).

2 Theoretical background

The intuitive notion of “fit” is a central premise for understanding strategic decision making within organisations (Venkatraman, 1989; Milgrom and Roberts, 1995). Since the seminal works of Chandler (1962) and Lawrence and Lorsch (1967), who first articulated that organisational efficiency arises from alignment between firm strategy, structure, and managerial processes, management researchers have explored “fit” from many angles. Defining and testing for fit within complex, interrelated systems however can be an empirical challenge (Schoonhoven, 1981; Drazin and Van de Ven, 1985).

An approach which has been lauded by scholars for correspondence between the theoretical concept and its formal, mathematical formulation is to define fit through matching between related variables (Milgrom and Roberts, 1995; Venkatraman, 1989). The mathematical concepts that underlie a matching approach are complementarity and substitutability. Formally, two variables are complements in production if the cross-partial derivative of the objective function with respect to the two inputs is positive, and substitutes if the cross-partial derivate is negative. An advantage of this optimization approach is that fit can be determined without referencing an outcome variable, such as system performance. Instead, total productivity is measured as the weighted sum of estimated complementarities among a system of relationships.

The matching approach has been used to study two-sided markets where the strategic aspects of partner choice drive the match. Unlike random utility models, which rely on random assignment and independence, matching models explicitly account for voluntary, intentional, joint selection by partners under conditions of rivalry which are based on strategic considerations, such as an expectation of mutual gain (Mortensen, 1988). The assumption of complementarity and assortative matching on quality underlies much of the literature on matching in two-sided markets and has been used to model the formation of marriage partnerships (Becker, 1973), investor-firm partnerships (Sorensen, 2007), strategic research alliances (Mindruta, 2013;

Mindruta et al., 2016), brand alliances (Yang et al., 2009), sponsorships (Yang and Goldfarb, 2015), as well as job matching in labour markets (Jovanovic, 1979).

The literature on matching in the executive labour market has largely focused on explaining the distribution of executive pay. Observed empirical outcomes in studies of executive–firm matches show sorting based on executive pay relative to firm size (Rosen, 1982; Gabaix and Landier, 2008) which is interpreted as evidence of a strong positive relationship between firm resources and managerial talent (Tervio, 2008). Edmans et al. (2009) expanded the matching model of firm size and executive pay to add executive risk aversion. However, few scholars have exploited the methodology to explore the multidimensional nature of match formation and address executive–firm fit. Exceptions include the recent work of Pan (2017), who observes complementarities on multiple attributes between executives and firms, and finds evidence of assortative matching on (i) firm size and executive talent, (ii) firm diversification and executive experience in conglomerates, and (iii) firm R&D intensity and executive technical experience.

This study matched executives and MNC subsidiaries along multiple dimensions to estimate which firm characteristics and human capital attributes jointly determine executive selection. Specifically, I explored whether the same mechanism – complementarity or substitutability – underlie executive–firm matching for both firm-specific attributes and general attributes. My study responds to a recent call for scholars to specify if human capital is a complementary resource, whether it acts a substitute to other firm resources, or whether it is neither (Mackey et al., 2014). The model has precise implications for the importance of firm-specific versus general human capital relative to firm characteristics and contributes to human capital theory by informing our understanding of executive–firm fit.

This research builds on current themes in the literature on strategic human capital, namely the recent reconceptualisation of general human capital as having firm-specific value. Traditional human capital theory (Becker, 1964) asserts that firms cannot enjoy competitive advantage from general human capital, because general skills are widely deployable. However, Campbell et al. (2012) argue that general human capital has the potential to be a source of competitive advantage for a firm if its use value at the focal firm is greater than at other firms in the market. In other words, they propose that the value of general human capital is not constant across firms. Instead, its value varies depending on how it fits with a firm's resources and strategic positioning.

Lazear (2009) offers a related observation and employs formal mathematical modelling to show that because firms' needs are unique, firms weigh general skills differently. Although on its own each general skill is not firm-specific, unique combinations of general human capital are. The implication of this is that idiosyncratic combinations of general human capital can be a source of value for both firms (as measured by firm performance) and workers (in terms of wage growth). Numerous empirical studies find support for this view and report greater returns to general human capital than to firm-specific human capital, when general human capital is proxied by occupational tenure (Gathmann and Schonberg, 2010; Lazear and Oyer, 2004; Dobbie et al., 2014; Sullivan, 2010; Nawakitphaitoon, 2014) or industry tenure (Neal, 1995; Parent, 2000). The presented study builds on this work, but instead of focusing on general and firm-specific human capital as determinants of earnings, I estimated multidimensional fit between firm and executive human capital attributes during the selection process.

This study also incorporates work on the role of industry conditions on firms' preferences for executive human capital. How firm performance impacts turnover has been studied extensively (Cannella and Lubatkin, 1993; Zhang and Rajagopalan, 2003; Ocasio, 1999; Dalton and Kesner, 1985; Guthrie and Datta, 1998), but recently scholars have turned their attention to examining how changes in environmental conditions alter demand for human capital attributes (Eisfeldt and Kuhnen, 2013; Jenter and Kanaan, 2015). I contribute to this growing literature by studying how complementarities between firm and executive attributes differ during an economic upturn (2005–2007) versus an economic downswing (2008–2010).

3 Hypotheses

Doing business in multiple countries exposes MNCs to a broad range of markets, technologies, and information. MNCs can then deploy this acquired knowledge in the management of their overseas subsidiaries and use it to compete against local rivals (Kogut, 1989; Bartlett and Ghoshal, 2004). Much of the acquired knowledge is tacit and requires human capital to successfully transfer it within firm boundaries (Hymer, 1976; Buckley and Casson, 1976; Caves, 1996; Teece, 1981; Kogut and Zander, 1993). As a result, executive human capital is fundamental to effectively manage multinational operations. However, executive–firm fit remains underexplored in the international context.

MNCs with numerous, globally dispersed subsidiaries use executives to manage knowledge flows within firm boundaries. Top-down knowledge transfer from the parent company to its subsidiaries is essential, because headquarters are sources of both managerial and technical know-how. However, subsidiary management must be able to address frictions arising from cross-country differences in cultures, systems and institutions, and satisfy the needs of local customers. Therefore, the human capital needs of multinational corporations are quite complex, which is why the foreign subsidiary setting is useful for the study of joint, multidimensional preferences of executives and firms.

Value creation from matching between partners arises out of alignment. Alignment can be driven by (i) complementarity and positive sorting on attributes, or (ii) it can emerge out of a substitution effect where one partner contributes what the other lacks and partnerships are created according to negative sorting on attributes.

In this study, I focus on the several fundamental relationships between firm and executive characteristics, some of which have already been examined in the literature using regression-based methods, while others are breaking new ground. The seven hypothesised relationships are as follows:

1. *A subsidiary executive's educational attainment is complementary to the size of the MNC.*
2. *A subsidiary executive's international experience is complementary to the scope of the MNC's international operations.*
3. *A subsidiary executive's relevant regional experience is complementary to the MNC's regional presence in Central & Eastern Europe.*

4. *A local subsidiary executive (a subsidiary-country national) is complementary to subsidiary age.*
5. *A subsidiary executive's tenure with the MNC is complementary to the subsidiary being an acquisition.*
6. *The joint preferences of MNCs and executives along the above-mentioned attributes will shift in response to an economic discontinuity.*
7. *The joint preferences of MNCs and executives along the above-mentioned attributes will differ for monitoring-oriented and implementation-oriented functional roles.*

In the following paragraphs, I provide a description of the above-listed relationships in more detail.

3.1 MNC size and executive educational attainment (general human capital)

Previous studies of executive–firm fit show a complementary relationship between firm size and managerial talent (Gabaix and Landier, 2008; Tervio, 2008; Bandiera et al., 2015), arguing that resource-rich firms can attract and compensate better-qualified managers and in turn, qualified managers want to work for firms where there is more to manage. I began my examination of mutual relationships between subsidiary–executive pairings by considering MNC size and general human capital in its most basic form – executive's education. It follows from the resource argument that larger MNCs (which are more complex to manage) can attract more qualified candidates (Berry et al., 2006). A common signal of an executive's qualification is his or her education level (Rose and Shepard, 1997; Hambrick and Mason, 1984). More highly educated executives are attracted to larger MNCs, because they arguably offer a more prestigious position and higher compensation. Indeed, research indicates that managers of MNC that are larger and more internationally-diversified earn a higher wage premium (Black et al., 2014). Therefore, I proposed to test a relationship between organisational economies of scale and general human capital from education. Specifically:

Hypothesis 1: A subsidiary executive's educational attainment is complementary to the size of the MNC.

3.2 Scope of international operations and executive international experience (general human capital)

Next, I considered the relationship between general human capital and organizational economies of scope. In MNCs, it is reasonable to measure scope in terms of the breadth of international operations. Forms of general human capital, which are particularly salient for MNCs, are executive international experience, regional experience, and national experience. MNCs with a more global footprint have access to executives with more international experience and also have demand for their skills (Greve et al., 2009). Individuals with previous international experience possess a unique competence to interact across cultures, and are effective boundary spanners (Yagi and Kleinberg, 2011) with a heightened capacity for solving complex problems (Fitzsimmons et al., 2011), making them attractive candidates for internationally diversified corporations. Similarly, individuals with previous international experience are attracted to global companies. Therefore, I proposed that executive–firm pairings will form based on

complementarity between executives' international experience and international scope of operations.

Hypothesis 2: A subsidiary executive's international experience is complementary to the scope of the MNC's international operations.

3.3 MNC regional presence and executive regional experience (general human capital)

Similarly, I expected to find complementarity between executives' relevant regional experience and the extent to which MNC operations are concentrated in the region. Executives who possess relevant regional experience are likely to be attractive for regionally-oriented MNCs, because they have expertise and know-how that is highly contextual and relevant (Argote and Miron-Spektor, 2011; Doz et al., 2001; Torres and Augusto, 2017). Executives with experience in the region understand the underlying sociocultural, economic, and political environment (Johnson and Duxbury, 2010). This is particularly important in the Central & Eastern European (CEE) region (which serves as the research context), as CEE countries are characterised by comparable levels of economic development, parallel political histories and challenges, similar cultural backgrounds, and demographics. Therefore, regional expertise can be expected to add value for MNCs with a CEE orientation.

Hypothesis 3: A subsidiary executive's relevant regional experience is complementary to the MNC's regional presence in Central & Eastern Europe.

3.4 Subsidiary age and executive nationality (general human capital)

The final type of general human capital I explored is national experience in the subsidiary country relative to subsidiary age. Previous regression-based studies show that as the subsidiary ages, headquarters' basis for control shifts as does the role of the subsidiary, resulting in decreased reliance on expatriates and greater utilisation of local executives (Gong, 2003). With time, the subsidiary becomes more integrated with the rest of the MNC, and is no longer as dependent on the parent company for supplying basic resources, such as capital, technology, and knowledge (Prahalad and Doz, 1981). Subsidiaries' talent and knowledge that had been built up by the MNC can be exploited through management localisation to local human resources who know the market and the customers well (Wang et al., 2004; Lam and Yeung, 2010; Bartlett and Yoshihara, 1988). I expected the following relationship:

Hypothesis 4: A local subsidiary executive (a subsidiary-country national) is complementary to subsidiary age.

3.5 Subsidiary acquisition status and executive MNC tenure (firm-specific human capital)

I then examined the relationship between subsidiary acquisition status and MNC preference for firm-specific human capital. The knowledge base of acquired subsidiaries can be weak, particularly in transition economies and developing countries (Lyles and Salk, 1996). Firm-specific human capital is likely to be important during the integration of a foreign acquisition

into the MNC, as firms transfer technological and management know-how (Franko, 1973; Tung, 1982; Tung, 1987).

Hypothesis 5: A subsidiary executive's tenure with the MNC is complementary to the subsidiary being an acquisition.

3.6 Estimating the impact of economic discontinuity on executive–firm preferences

In a multidimensional competitive assignment model, parameters of the above-described hypothesised relationships are determined simultaneously. Therefore, it is possible to compare the weights that MNCs place on executives' firm-specific knowledge relative to the four types of general knowledge (education, international experience, regional experience, and national experience) during the selection process.

I modelled the above-listed relationships in two states of the world: during an economic upswing (2005–2007) and during an economic downturn (2008–2010). A shift in economic conditions changes firms' skill demands, and the quality of existing executive–firm matches deteriorates (Eisfeldt and Kuhnen, 2013). Therefore, I expected to observe a difference in magnitudes on the relative weights that firms place on general knowledge relative to firm-specific knowledge during good economic times versus bad, which led to the following hypothesis:

Hypothesis 6: The joint preferences of MNCs and executives along the above-mentioned attributes will shift in response to an economic discontinuity.

The above-written hypothesis is verifiable; however, it is purposely formulated in broad terms. Not only have economic conditions been unexplored by scholars as impacting firms' relative preferences for firm-specific versus general human capital, but there also remains a lack of consensus in the theoretical and empirical literature on a more basic issue – which is, whether the formation of the job match is driven by firm preference for firm-specific human capital or general human capital in the first place. By testing Hypothesis 6, (i) I inform our understanding of firm behaviour in attracting firm-specific versus general human capital to executive positions, and (ii) by comparing the joint preferences of executives and firms in two distinct economic environments, I provide evidence of how these preferences can shift relative to economic conditions.

3.7 Estimating executive–firm preferences for two types of functional roles

Finally, I expected to observe a difference in firms' skill-weights for different functional roles. In the functional role literature, there are two broad distinctions among functional roles based on their job descriptions and delegation of responsibilities (for a review of the functional role literature, see Menz, 2012). In particular, among the individual functional roles, there appears to be a difference in emphasis and amount of time spent on (i) control and oversight versus (ii) implementation.

In general, the tasks of the Chief Executive Officer (CEO), Deputy CEO, and Chief Financial Officer (CFO) involve strategy making and subsequent monitoring of organisational progress,

require communicating with external stakeholders, and are oriented toward the long-term (Hambrick and Cannella, 2004). For example, the CFO function is defined as having “critical say in key strategic and operational decisions, from evaluating business unit performance, inventing new ways to leverage capital, [...], to serving as the company’s primary ambassador to investors and financial analysts” (Zorn, 2004). From the definition, it is clear that CFOs are considered agents of control and oversight.

In contrast, implementation roles, such as those of the Chief Operating Officer (COO), Chief Marketing Officer (CMO), or Chief Legal Officer (CLO) are tasked with short-term strategy execution and their responsibilities involve resolving operating matters internal to the firm (Hambrick and Cannella, 2004). The COO “is typically the key individual responsible for delivery of results day-to-day, quarter-to-quarter” (Bennett and Miles, 2006). Similarly, the responsibilities of CMOs and CLOs are to enact and support the strategies created by the CEO and monitored by the CFO. Therefore, these types of roles broadly emphasise implementation over monitoring and control.

The distinction between responsibilities related to monitoring and implementation roles can be expected to influence the determinants of executive–firm fit, which leads to the following hypothesis:

Hypothesis 7: The joint preferences of MNCs and executives along the above-mentioned attributes will differ for monitoring-oriented¹ and implementation-oriented² functional roles.

4 Empirical setting

4.1 Industry setting

I analysed complementarities between firm-specific and general executive human capital and MNC and subsidiary characteristics in the context of national subsidiaries of US and Western European multinational banks, located in Central & Eastern Europe. The context is characterised by heterogeneous firms with varied human capital needs, and the timeframe allows for an examination of how MNCs’ human capital preferences shifted during the business cycle, and how they differed among functional roles.

Prior to the transition from centrally-planned economies to market economies in 1989/1990, the financial sector in Central & Eastern Europe was undeveloped. CEE countries operated largely as cash economies. The fall of the Iron Curtain changed the industry, requiring the inflow of financial expertise, technological infrastructure, and managerial experience from western countries. The CEE financial sector drew investors mainly from Western Europe and to a lesser extent from the United States, and today these “western” MNCs control the majority of the financial institutions in this market.

¹ Monitoring-oriented functional roles included Chief Executive Officer (CEO), Deputy CEO, and Chief Financial Officer (CFO).

² Implementation-oriented functional roles included Chief Operating Officer (COO), legal executives, and sales executives.

This is not to say that banking institutions did not exist in Central & Eastern Europe prior to 1990. On the contrary, each CEE country had firmly established state-owned banks that were monopolists in a sub-industry, such as retail banking, corporate banking, or import/export financing. These state-owned monopolists enjoyed nearly 100% market share in their segment. During the 1990s and early 2000s, Central and Eastern European state-owned banks became attractive acquisition targets for Western multinationals – such as France’s Société Générale, Austria’s Erste Group and Raiffeisenbank, or Italy’s Unicredit – and from a financial standpoint, these acquisitions were exceptionally lucrative. However, integrating national subsidiaries into the international network was not without its challenges. New owners needed to transfer know-how and make substantial technological investments in order to bring the CEE subsidiaries up to Western standards.

However, the acquiring firms also inherited dense branch networks and a loyal clientele, who demanded a localised strategy and financial products in local currencies that were calibrated to local economic and institutional conditions. Not all MNCs entered the CEE market via acquisition, however. Banking groups such as Citibank, BNP Paribas, or HSBC developed greenfield operations and established a market presence by generating new business or attracting retail and corporate customers from the former monopolists.

Following years of healthy growth and development, the global financial industry experienced a crisis in 2008, which created economic disturbances in many countries including the CEE region. A shift in economic conditions reduced the quality of executive–firm fit, and changed firms’ demand preferences for executive characteristics, prompting executive turnover (Eisfeldt and Kuhnen, 2013). In my model, I used the global financial crisis to determine how fit differs during economic upswings versus downturns. Specifically, I explored whether different economic conditions shifted how firms valued firm-specific and general human capital relative to MNC and subsidiary attributes.

4.2 Data sample

To study executive–firm fit, I used panel data on executive appointments to wholly-owned subsidiaries of multinational banks during the six-year period from 2005–2010. The unit of analysis is the executive–subsidiary pair and the analysis was based on 2063 observed job matches. I included both new hires and continuing appointments in the analysis, because I considered the choice to reappoint an executive in the following year as affirmation of executive–subsidiary fit by both partners. Subsidiary executives were defined as individuals who belong to the executive committee, as self-reported by the subsidiaries in their annual reports and/or company web pages. The study sample included 75 subsidiaries of 33 US and European banks from 15 different countries, located in 12 Central and Eastern European countries. Of the 1068 matching records with complete information on executive and firm attributes, 473 matching records were observed in the 2005–2007 period and 595 were observed in 2008–2010. 433 records were of executives in monitoring roles, while 486 records represented executives in implementation roles, and the remaining 149 records did not clearly fit either functional role category.

The data were collected from subsidiaries providing retail, private and/or commercial banking services, and came from subsidiary annual reports, MNC annual reports, LinkedIn, and the Orbis Bank Focus Database. Information on appointed subsidiary executives and their human capital attributes were obtained from top management team biographies as presented in subsidiary-level annual reports. The information provided in these biographies was supplemented by educational and experiential histories available through LinkedIn. Subsidiary-level characteristics of subsidiary age and acquisition status came from the Orbis Bank Focus database, as did the information on MNC size. The international scope of MNC operations and the extent of its regional focus were sourced from MNCs' annual reports.

Table 1. Study sample details

| List of MNC home countries | List of subsidiary host countries | List of MNC names | |
|----------------------------|-----------------------------------|---------------------------|---------------------------|
| Austria | Bulgaria | Allied Irish Banks Group | HVB |
| Belgium | Croatia | Alpha Bank | Hypo Group Alpe Adria |
| Denmark | Czech Republic | BNP Paribas | Intesa Sanpaolo |
| Germany | Estonia | Banco Comercial Portugues | KBC Group |
| France | Hungary | Bayern LB | MDM Bank Group |
| Greece | Kazakhstan | Citigroup | National Bank of Greece |
| Hungary | Latvia | Commerzbank | OTP |
| Ireland | Lithuania | DNB Nord | Piraeus Bank |
| Italy | Poland | DZ Bank | Procredit Group |
| Norway | Romania | Danske Bank | Raiffeisesn International |
| Portugal | Slovakia | Deutsche Bank | SEB |
| Russia | Ukraine | Emporiki Bank of Group | Societe General |
| Sweden | | Erste Group | Swedbank |
| UK | | Eurobank EFG | Unicredit |
| USA | | Fortis | Volksbank |
| | | General Electric | WestLB |
| | | HSBC | |

4.3 Definitions of variables

4.3.1 Executive information

For each executive, I obtained five types of information: educational attainment, international experience, regional experience, nationality, and MNC tenure.

Educational attainment is a categorical variable, where

Educational attainment = 0 for no college degree
= 1 for bachelor's degree
= 2 for master's degree
= 3 for Ph.D. degree.

International experience is a continuous variable with zero as its minimum possible value. It is the sum of cultural distances³ between all possible pairs of countries where the executive has gained national, educational, or work experience, and captures diversity of international experiences. Unlike a simple count of unique national experiences, this measure incorporates a notion of “hardship” associated with adapting to a different national culture. For example, working in the United States and Canada represents two unique national experiences, but the need for cultural adaptation between United States and Canada is considered less than, for example, between the United States and Romania. By summing cultural distances between pairs of countries where the executive has gained experience, I captured the individual’s experience level in integrating disparate national experiences. More formally,

$$\text{International experience} = \sum_{k,l \in C, k \neq l} (\text{Cultural distance}_{k,l}),$$

where k, l reference pairs of countries within the country set C of the executive’s past national, educational, or professional experiences.

Regional experience is a binary variable, where

$$\begin{aligned} \text{Regional experience} &= 1 && \text{if the executive has national, educational, or} \\ & && \text{work experience in the CEE region} \\ &= 0 && \text{otherwise.} \end{aligned}$$

National experience is a binary variable, where

$$\begin{aligned} \text{National experience} &= 1 && \text{if the executive’s nationality country matches the} \\ & && \text{subsidiary country} \\ &= 0 && \text{otherwise.} \end{aligned}$$

Firm-specific experience is measured as the executive’s tenure in years with the MNC.

4.3.2 Firm information

For each subsidiary in the sample, the data contain the parent company’s size, scope of international operations, regional presence, and information on the subsidiary’s age and acquisition status.

MNC size is the MNC’s total global assets measured in US dollars, in a given year.

Scope of MNC international operations is measured as the number of countries globally where the MNC is present, in a given year.

MNC regional presence is measured as the proportion of the number of countries in Central & Eastern Europe where the MNC operates through wholly-owned subsidiaries relative to the

³ Cultural distance is a multi-dimensional measure which integrates power distance (respect for authority), uncertainty avoidance (interpersonal trust), individualism (independence and role of government), and masculinity (importance of family and work) as measured in the World Values Survey.

number of countries globally where the MNC is present, in a given year. It is a proxy for the significance of the CEE region relative to the overall breadth of global MNC operations.

Subsidiary age denotes the number of years since the parent company has acquired the subsidiary or established greenfield operations in the subsidiary country.

Subsidiary is an acquisition is a binary variable, which is set equal to 1 if the subsidiary was established through acquisition, and is set to 0 if it was developed as a greenfield.

5 The two-sided matching model

Job assignments are voluntary, strategic pairings between firms and individuals made under competitive conditions, which is why it is intuitive to think of these relationships using the equilibrium framework of a two-sided matching model. Agents form matches along multiple dimensions with an expectation of mutual gain. Both firms and individuals comprise heterogeneous, indivisible bundles of traits for which no separate markets exist (Mortensen, 1988). Partner choice is driven by agents' preferences but the choice set is constrained by the decisions of other market actors. The equilibrium condition that underlies the framework relies on the plausible assumption that executives and firms choose their best available matches. In equilibrium, no executive–firm pair wishes to deviate from its existing match and form a new match.

In my model, the market is characterised by two finite, disjoint sets of agents: MNC subsidiaries $S = \{s_1, s_2, \dots, s_i\}$ and executives $E = \{e_1, e_2, \dots, e_j\}$. I assumed search is costless and both executives and firms are aware of potential partners. Each firm can hire multiple executives, but each executive works for only one firm.

5.1 Local production maximisation

To formally define equilibrium, I employed the local production maximisation condition developed by Fox (2010a), where “production” represents the joint value of the executive–firm match. The production function $f(s_m, e_n)$ denotes the match-specific productivity of a pairing between attributes of subsidiary s_m and executive e_n . It is formally defined as:

$$f(s_m, e_n) = \Delta V(s_m, e_n) + \Delta U(s_m, e_n), \quad (1)$$

where $\Delta V(s_m, e_n)$ is the value that executive n adds to subsidiary m and $\Delta U(s_m, e_n)$ is the value that subsidiary m provides to executive n . Although endogenous transfers are taking place to clear the market, I did not observe how match participants divide rents generated by the realised match. Consequently, I could not separately identify match preferences for individuals and firms – nor is that the goal of this study. Instead, I exploited the assumption that the *joint* productivity of realised matches exceeds the *joint* productivity of every possible counterfactual match that did not occur. By comparing realised matches between executives and firms against possible counterfactual matches, I determined which interactions between firm and executive attributes drive match productivity, and estimated the relative importance of particular complementarities.

5.2 Production function specification

I defined the match value (shown in general form in equation (1)) as a function of five interactions between firm and executive attributes. The interaction terms capture the match specificity in productivity, as follows:

$$f(s_m, e_n) = \beta_1 S_{1m} E_{1n} + \beta_2 S_{2m} E_{2n} + \beta_3 S_{3m} E_{3n} + \beta_4 S_{4m} E_{4n} + \beta_5 S_{5m} E_{5n} + \varepsilon_{s_m e_n}, \quad (2)$$

where $s_m = (S_{1m}, S_{2m}, S_{3m}, S_{4m}, S_{5m})$ are vectors of firm attributes (MNC-level and subsidiary-level) and $e_n = (E_{1n}, E_{2n}, E_{3n}, E_{4n}, E_{5n})$ are vectors of executive characteristics.

S_{1m} is MNC size, E_{1n} is executive educational attainment.

S_{2m} is the MNC's scope of international operations, E_{2n} is executive international experience.

S_{3m} is the MNC's regional presence in CEE, E_{3n} is executive regional experience in CEE.

S_{4m} is subsidiary age, E_{4n} is executive nationality.

S_{5m} is the subsidiary's acquisition status, E_{5n} is executive tenure in the MNC.

Control variables (such as executive or firm fixed effects) which would enter the production function as non-interactive terms could contribute to match productivity. However, non-interactive terms enter into the objective function on both sides of the inequality, are differenced out, and therefore remain unidentified.

5.3 Maximum score function

Suppose we have two subsidiaries, s_1 and s_2 , and two executives, e_1 and e_2 , and we observe realised pairs (s_1, e_1) and (s_2, e_2) . The local production maximisation condition states that a match is pairwise stable if neither the firm nor the executive wishes to exchange partners. Formally, the following is assumed to hold true and underlies the solution concept:

$$f(s_1, e_1) + f(s_2, e_2) \geq f(s_1, e_2) + f(s_2, e_1) \quad (3)$$

This means that the sum of match-specific productivities of two realised matches $\{(s_1, e_1), (s_2, e_2)\}$ must be greater than the sum of match-specific productivities of counterfactual matches $\{(s_1, e_2), (s_2, e_1)\}$.

I invoked the local production maximisation condition for all combinations of two realised executive–firm pairs and their counterfactual pairings, setting up a system of inequalities. I then applied maximum score estimation (Manski, 1975) where the objective is to maximise the total number of inequalities (3) which are satisfied in the system. The maximum score function is a consistent, semi-parametric estimator that requires the production function to be specified, but makes no assumptions about the distribution of the error terms. This study used information on observed executive selection without including transfer data on compensation, which is sufficient for implementing the multinomial maximum score estimator. For a proof of set identification and consistency for maximum score estimators in a two-sided matching game without transfers, see

Fox (2010b). In the case of executive–firm matching without transfer data, the objective function Q can be written as:

$$Q(f) = \sum_{\{a,b,i,j\} \in A_x} 1[f(s_a, e_i) + f(s_b, e_j) \geq f(s_a, e_j) + f(s_b, e_i)], \quad (4)$$

where $\{a,b,i,j\}$ is a realised quartet of two matched executive–firm pairs in the observed market x . Function $1[\cdot]$ is the indicator function that is equal to 1 when the inequality in the bracket is true. The maximum score estimator can be any production function f whose parameters maximise the score function $Q(f)$. For this study, the maximum score estimator serves to identify parameters $\beta_1, \beta_2, \beta_3, \beta_4$, and β_5 (see equation 2), which maximise the objective function (equation 4) in terms of the production function specified in equation (2):

$$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 = \text{argmax}[Q(f)], \quad (5)$$

6 Estimation

6.1 Procedure

In this section, I describe the estimation procedure.

Step 1: Construct variables. Transform variables defined in section 4.3 in terms of each variable's cumulative distribution function (CDF) to reflect the ranks of player attributes on both sides of the market.

Step 2: Define markets. Separate the full sample of observed executive–subsidiary pairs and their attributes into groups by functional role (monitoring-oriented functional role and implementation-oriented functional role) and by year. Executives in the same functional role category during the same year are considered at risk of being appointed to subsidiary s_m in a given year.

Step 3: Generate interaction terms for observed executive–subsidiary matches. Multiply each transformed variable from the vector of firm attributes s_m with its hypothesized counterpart variable from the vector of executive attributes e_n .

Step 4: Construct exchange pairs. In each market, create an exhaustive list of all possible executive–subsidiary dyads. A dyad consists of two executives e_1 and e_2 and two subsidiaries s_1 and s_2 , where $\{(s_1, e_1), (s_2, e_2)\}$ are the two realised matches, and $\{(s_1, e_2), (s_2, e_1)\}$ are their respective counterfactual matches. For each realised and counterfactual pair, the dataset contains attribute variables and the interaction terms calculated in Step 3.

Step 5: Generate interaction terms for counterfactual executive–subsidiary matches. For the counterfactual pairs $\{(s_1, e_2), (s_2, e_1)\}$, multiply variables from executive e_1 's vector of attributes

with variables from the counterfactual subsidiary s_2 's vector of attributes. Then multiply executive e_2 's vector of attributes with the attributes of the counterfactual subsidiary s_1 .

Step 6: Invoke the differential evolution method. Perform a search algorithm using the differential evolution method to identify parameters β_1 , β_2 , β_3 , β_4 , and β_5 (see equations (5) and (2)), which maximise the objective function $Q(f)$ given in equation (4). Calculate confidence intervals for parameter point estimates using a sub-sampling procedure.

6.2 Differential evolution method

The objective function described in equation (4) was optimised using the differential evolution algorithm for global optimisation (Storn and Price, 1997). An implementation of this algorithm exists within the statistical programming environment R in the form of a well-validated and cited toolkit "DEoptim". The objective function of the maximum score estimator is a step function and therefore many local optima may exist in the solution set. The differential evolution (DE) approach is well suited for the optimization problem at hand, as it does not require continuity or differentiability of the optimization function. As opposed to "hill-climbing", it combines and alternates between local search (evolutionary selection of candidate solutions) and distant search (mutation-based alteration of candidate solutions) to explore the solution space, and converge upon a global optimum.

The DEoptim toolkit is a set of general-purpose optimisation algorithms, consisting of multiple variants on the optimisation method. The exact behaviour of the program can be controlled by a number of parameters. After careful analysis of available options during which I experimented with step iteration sizes, optimisation strategies, and iteration counts, I ran the final optimisation processes within the empirically determined ("lower", "upper") coefficient limits on my parameters of interest β_1 , β_2 , β_3 , β_4 , and β_5 of $(-5, 5)$, with population size of 80 evolving solutions, and cross-over probability of 90% ($CR = 0.9$). I completed 10,000 iterations for each process, which invariably yielded convergence. Using Windows 8-64 operating system, 8-core i7 3.4 GHz CPU, and 12 GB of RAM, each individual optimisation process (10,000 iterations) required about 4 hours of CPU time to complete.

Because maximum score estimation does not assume any particular distribution of error terms, I repeated the optimisation procedure using subsampling techniques in order to determine confidence intervals for individual solutions. I used a "leave 10% out" subsampling strategy 10 times by randomly selecting 90% of the dyads in the dataset. The left-out 10% subsets were non-intersecting. The initial population of candidate solutions is always determined randomly, and therefore no two repeated runs give identical results. As a consequence, the presented point estimates need to be viewed as statistically valid within a 90% confidence interval.

6.3 Identification

The identification strategy which underlies the matching method in this study depends on the assumption that the labour market is in a pairwise stable equilibrium where neither executives nor firms which are currently matched would gain from forming a counterfactual match. By observing active players in the market and their attributes, the matching method quantifies firms'

preferences in the context of limited human capital availability. However, because the observed executive–subsidiary pairings do not represent the universe of executive appointments to MNC subsidiaries, my model is missing some subset of possible jobs that actually are in a given executive’s set of employment options, and some subset of possible job candidates that are in a given subsidiary’s set of potential hires. In other words, the set of counterfactual appointments is incomplete, which potentially influences the parameter estimates provided by the matching model.

In order for inference to be valid, we have to believe that the attributes of the missing counterfactual partners are sufficiently similar to those of the executives and subsidiaries that are in the sample. As shown in the descriptive statistics in the next section, the observable characteristics of executives, subsidiaries, and the associated MNCs are quite heterogeneous. Therefore, the sample participants may in fact accurately represent executives’ and firms’ choice sets of potential partners, and not having access to the complete universe of executive–subsidiary appointments is perhaps immaterial to the results.

7 Results and discussion

In this section, I summarise key features of the dataset and present the matching patterns identified by the maximum score estimator.

7.1 Descriptive statistics

Table 2 reports the number of executive–subsidiary matches by year and functional role, both prior to and following restrictions based on data availability of executive or firm characteristics.

Table 2. Number of executive-subsidiary matches by year and functional role

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | TOTAL |
|---|------|------|------|------|------|------|-------|
| Total number of matches | 256 | 339 | 345 | 378 | 388 | 357 | 2063 |
| Total number of matches with full information | 124 | 167 | 182 | 203 | 210 | 182 | 1068 |
| of which: | | | | | | | |
| Monitoring role matches | 51 | 65 | 80 | 80 | 80 | 77 | 433 |
| Implementation role matches | 56 | 74 | 79 | 79 | 108 | 90 | 486 |
| Other | 17 | 28 | 23 | 44 | 22 | 15 | 149 |

Table 3 presents summary statistics for the raw data on subsidiaries, MNCs, and executives, and demonstrates the heterogeneity of firm and individual characteristics in the sample. For example, MNCs in the sample range from \$2 billion to \$3 trillion in assets, and have an international presence ranging from five countries to 100 countries worldwide. Some MNCs focus exclusively on the CEE region, while for others it represents a minor proportion of global operations. MNC subsidiaries range in age from one to 24 years. 76% are acquisitions while the remaining 24% are greenfield developments. The executives in the sample have an average of 1.6 educational degrees, 83% have experience in the CEE region, 62% are local managers from the subsidiary country, and the length of individuals’ tenure with the MNC ranges anywhere from one to 41 years, with an average of 10 years of firm-specific experience.

Table 3. Summary statistics of raw data

| Variable | Obs | Mean | St. Dev. | Min | Max |
|--|------|-------|----------|-----|--------|
| MNC assets (in USD billion) | 1068 | 464.0 | 562.5 | 2.0 | 3065.1 |
| Scope of MNC international operations | 1068 | 23.3 | 26.3 | 5 | 100 |
| MNC regional presence | 1068 | 0.7 | 0.3 | 0.1 | 1.0 |
| Subsidiary age | 1038 | 9.8 | 4.0 | 1 | 24 |
| Subsidiary is an acquisition | 1068 | 0.8 | 0.4 | 0 | 1 |
| Executive educational attainment | 1068 | 1.6 | 0.7 | 1 | 3 |
| Executive international experience | 1068 | 64.5 | 92.6 | 0 | 582.8 |
| Executive regional experience | 1068 | 0.8 | 0.4 | 0 | 1 |
| Executive nationality matches subsidiary country | 1068 | 0.6 | 0.5 | 0 | 1 |
| Executive tenure with MNC | 1068 | 10.2 | 7.2 | 1 | 41 |

Table 4 presents correlations between firm and executive attributes in their CDF forms. The pairwise correlation results show that for observed executive–subsidiary partnerships, there is very little correlation between the five relationships that I test using the matching model (correlations between hypothesised relationships are highlighted in bold). However, pairwise correlations between individual attributes of existing partnerships do not inform our understanding about the drivers of match formation because simultaneous multi-attribute matching occurs within a system and is codetermined by the actions of other players in the market. Executives and firms each possess heterogeneous bundles of indivisible traits. Therefore, a “perfect” match along all attributes is often not feasible. Instead, executives and firms evaluate which attributes are more important for achieving overall job fit for their own individual case, and then make the necessary compromises on the remaining attributes. To find out which attribute combinations drive executive selection in MNC subsidiaries in the context of an interdependent system, we have to examine the estimated parameters provided by the maximum score estimator function.

Table 4. Correlations

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|-------------|-------------|--------------|-------------|-------------|-------|-------|-------|-------|------|
| 1. MNC assets | 1.00 | | | | | | | | | |
| 2. Scope of MNC international operations | 0.54 | 1.00 | | | | | | | | |
| 3. MNC regional presence | −0.38 | −0.70 | 1.00 | | | | | | | |
| 4. Subsidiary age | 0.15 | 0.09 | 0.00 | 1.00 | | | | | | |
| 5. Subsidiary is an acquisition | 0.33 | −0.12 | −0.02 | −0.59 | 1.00 | | | | | |
| 6. Executive educational attainment | 0.02 | 0.00 | −0.07 | 0.04 | −0.03 | 1.00 | | | | |
| 7. Executive international experience | 0.12 | 0.11 | −0.09 | 0.03 | −0.01 | 0.34 | 1.00 | | | |
| 8. Executive regional experience | −0.01 | −0.02 | −0.03 | 0.06 | 0.05 | 0.05 | −0.25 | 1.00 | | |
| 9. Executive nationality matches subsidiary country | −0.03 | 0.00 | 0.02 | 0.01 | 0.00 | 0.04 | −0.55 | 0.57 | 1.00 | |
| 10. Executive tenure MNC | 0.19 | 0.19 | −0.18 | −0.01 | 0.13 | −0.07 | 0.27 | −0.03 | −0.35 | 1.00 |

Note: Bold face denotes correlations between hypothesized relationships.

7.2 Findings

Executives and MNC subsidiaries match along multiple attributes simultaneously in an effort to optimise overall executive–firm fit. To determine which attribute interactions drive the matching process, how these patterns change under different economic conditions, and how they differ for the two types of functional roles, it was necessary to examine the five matching dimensions

simultaneously. The maximum score estimator allows for simultaneous estimation of multiple parameters. The parameter estimates, which correspond to the cross-partial derivatives of the production function, quantify the relationship between executive–firm attributes and allow for comparison of the strength of each relationship relative to others in the model. Because the variables have been translated to their CDFs, the signs and magnitudes of the parameter estimates provide information on the strength of complementarities/substitutions between executive–firm attribute pairs. Furthermore, the relative magnitudes of parameter estimates reveal which attribute pairs are the strongest determinants of a job match. The point estimates are considered significant if the 90% confidence interval does not include zero.

Table 5. Maximum score education

| | | Monitoring roles | | Implementation roles | | Interaction | Human capital type |
|---------------------------------------|-------|------------------|----------------|----------------------|----------------|--|-----------------------------------|
| | | Point Est | 90% CI | Point Est | 90% CI | | |
| Years 2005–2007 (ECONOMIC UPSWING) | Beta1 | 0.86 | (0.64, 0.87) | –0.69 | (–2.57, 0.40) | MNC size * executive educational attainment | Educational general human capital |
| | Beta2 | 1.46 | (1.12, 1.51) | –1.57 | (–1.54, 4.85) | Scope of MNC international operations * executive international experience | International human capital |
| | Beta3 | –3.19 | (–3.34, –2.56) | –1.93 | (–2.73, –4.25) | MNC regional presence * executive regional experience | Regional human capital |
| | Beta4 | –4.75 | (–4.80, –3.81) | 1.14 | (0.28, 2.31) | Subsidiary age * executive nationality matches subsidiary country | Country-specific human capital |
| | Beta5 | 3.90 | (3.10, 4.71) | 4.82 | (3.36, 4.88) | Subsidiary is an acquisition * executive tenure in MNC | Firm-specific human capital |
| Number of inequalities | | 6928 | | 9059 | | | |
| % satisfied | | 65% | | 57% | | | |
| Years 2008–2010 (ECONOMIC UPSWING) | Beta1 | 4.45 | (4.21, 4.93) | –2.93 | (–4.26, –2.48) | MNC size * executive educational attainment | Educational general human capital |
| | Beta2 | 0.39 | (–0.92, 0.45) | –3.62 | (–4.96, 0.35) | Scope of MNC international operations * executive international experience | International human capital |
| | Beta3 | –1.52 | (–1.80, –0.93) | –3.84 | (–4.48, –3.58) | MNC regional presence * executive regional experience | Regional human capital |
| | Beta4 | 1.43 | (1.30, 4.20) | 4.59 | (3.25, 4.92) | Subsidiary age * executive nationality matches subsidiary country | Country-specific human capital |
| | Beta5 | 1.53 | (0.51, 1.74) | 1.00 | (0.93, 1.51) | Subsidiary is an acquisition * executive tenure in MNC | Firm-specific human capital |
| Number of inequalities | | 9534 | | 17456 | | | |
| % satisfied | | 57% | | 56% | | | |

7.2.1 Monitoring roles

Table 5 summarises the results of the study. Focusing on results for monitoring roles in the subsidiary executive team (which include CEOs, Deputy CEOs, and CFOs), the results show that *during an economic boom (2005–2007)*, executive–subsidiary matching is driven by

complementarities between MNC size and executive education (H1 supported), complementarities between scope of international operations and executive international experience (H2 supported), substitution between MNC regional presence and executive regional experience (H3 unsupported), substitution between subsidiary age and executive national experience (H4 unsupported), and complementarity between acquired subsidiaries and executive tenure with the MNC (H5 supported). With a parameter value of -4.75 , the strongest determinant of executive–subsidiary job matching is negative sorting on subsidiary age and executive nationality matching the subsidiary country. In other words, the older a subsidiary is, the less often it selects executives who are subsidiary-country nationals. The second strongest determinant, with a parameter value of 3.90 , is acquired subsidiaries selecting longer-tenured executives than greenfield subsidiaries. The weakest driver of an executive–subsidiary match is complementarity between MNC size and executive education.

Relative to the selection patterns observed during 2005–2007, two major differences arise for monitoring roles *during an economic crisis* (2008–2010), providing support to Hypothesis 6. The strongest determinant of executive–subsidiary matching is now complementarity between MNC size and executive education (parameter value of 4.45). In contrast to an economic boom, the older a subsidiary is, more executives are from the subsidiary country (parameter value of 1.43) during an economic downturn. H1, H2, H4, and H5 are supported. H3, which predicts complementarity between MNC regional presence and executive regional experience, remains unsupported for monitoring roles under both sets of economic conditions.

7.2.2 Implementation roles

Turning to implementation roles (which include COOs, legal executives, and sales executives), executive–subsidiary matching is driven by substitution between MNC size and executive education (H1 unsupported), substitution between scope of international operations and executive international experience (H2 unsupported), substitution between MNC regional presence and executive regional experience (H3 unsupported), complementarity between subsidiary age and executive national experience (H4 supported), and complementarity between acquired subsidiaries and executive tenure with the MNC (H5 supported). These observations apply *during economic upswings and economic downturns*. During an economic upswing, at a parameter value of 4.82 , the strongest determinant of an executive–subsidiary match is a complementary relationship between acquired subsidiaries hiring executives with longer MNC tenure. During an economic downturn, at a parameter value of 4.59 , the strongest determinant is complementarity between subsidiary age and the appointed executive being from the subsidiary country. These differences between selection patterns in economic upswings and downturns in the implementation role provide further support for Hypothesis 6.

7.2.3 Types of functional roles

The performed analysis revealed a different selection pattern for different functional roles, i.e., for monitoring and implementation roles, thus supporting Hypothesis 7. The support was present during both types of market conditions. Table 6 summarises the support or lack thereof for all seven tested hypotheses.

Table 6. Results of hypothesis testing

| | Economic Upswing | | Economic Downturn | |
|---|-------------------------|--------------------------|----------------------------|--------------------------|
| | Monitoring | Implementation | Monitoring | Implementation |
| H1: A subsidiary executive's educational attainment is complementary to the size of the MNC. | Yes | No | Yes | No |
| H2: A subsidiary executive's international experience is complementary to the scope of the MNC's international operations. | Yes | No | Yes | No |
| H3: A subsidiary executive's relevant regional experience is complementary to the MNCs' regional presence in Central and Eastern Europe. | No | No | No | No |
| H4: A local subsidiary executive (a subsidiary-country national) is complementary to subsidiary age. | No | Yes | Yes | Yes |
| H5: A subsidiary executive's tenure with the MNC is complementary to the subsidiary being an acquisition. | Yes | Yes | Yes | Yes |
| H7: The joint preferences of MNCs and executives along the above-mentioned attributes will differ for monitoring-oriented and implementation-oriented functional roles. | Yes | | Yes | |
| | Monitoring role | | Implementation role | |
| | Economic Upswing | Economic Downturn | Economic Upswing | Economic Downturn |
| H6: The joint preferences of MNCs and executives along the above-mentioned attributes will shift in response to an economic discontinuity. | Yes | | Yes | |

7.3 Discussion

The results of this study on the determinants of executive–subsidiary matching show that the relationship between human capital and the firm's resource base is largely complementary. However, the value of general human capital and firm-specific human capital shifts depending on external conditions and depending on the type of functional role appointment.

For monitoring roles (CEOs, Deputy CEOs, CFOs) and implementation roles (COOs, legal executives, sales executives) alike, firm-specific human capital dominates educational general human capital in match formation during an economic upswing. However, during an economic downturn, firm-specific human capital is now a comparatively weak determinant of match formation and educational general human capital dominates executive selection, but only for monitoring roles.

As such, these results make an important contribution and respond to recent calls for specifying the relationship between human capital and firm resources (Mackey et al., 2014). After methodologically accounting for selection and labour availability, both firm-specific human capital and general human capital function as complementary resources. However, their importance for executive selection shifts depending on external circumstances. Firm-specific human capital is the dominant determinant of an executive selection during an economic

upswing for both types of roles, but during an economic downturn firm-specific human capital is nearly four times weaker in driving an executive–subsidiary match than general human capital (for monitoring roles, parameter values of 1.53 versus 4.45 in bottom left quadrant of Table 5). These results corroborate the findings reported in the executive succession literature, which show that firms appoint outsider CEOs without firm-specific knowledge following negative shocks (Datta and Guthrie, 1994; Guthrie and Datta, 1998).

In examining how the determinants of executive–subsidiary matches differ between monitoring roles and implementation roles, the results point to a difference in selection strategies. While candidates for monitoring roles are being selected based on complementarities with MNC tenure (firm-specific human capital) and international experience (international human capital), implementation roles are in contrast being selected on complementarities with national experience (country-specific human capital). It is also of note that the advanced hypotheses are supported to a greater extent by the data on monitoring roles (H1, H2, H4, and H5), than by the data on implementation roles (H4, H5 only) (see Table 6 for a summary). Because many of the hypotheses were formulated based on previous research findings, this could indicate that executive selection research disproportionately focuses on CEO appointments, and comparatively little attention is being paid to selection patterns in the rest of the top management team.

Upon examining the relative weights placed on the different types of general human capital during the selection process, the results show that broadly relevant general human capital is a comparatively weaker determinant of executive–subsidiary matches than general human capital that is expressly relevant to subsidiary operations. The absolute magnitude of the parameter on country-specific human capital is the largest, followed by regional human capital, international human capital, and educational human capital. These matching results suggest that more specific types of general human capital offer greater value than broadly applicable general human capital, and hold true with one exception. In the case of CEO, Deputy CEO, and CFO appointments during economic downturns, education – which is the most broadly applicable human capital – trumps all other types of general human capital in determining an executive–subsidiary match. These findings have useful implications for the current debate in strategic human capital theory about the firm-specific value of general human capital. The results imply that in foreign subsidiaries of multinational banks, executive selection is driven by considerations regarding relevant country experience more so than by international experience or educational attainment. Overall, through the use of an alternative methodological approach (Ryan, 2017), this study has extended theory on executive selection and contributed to our understanding of strategic human capital.

7.4 Study limitations and future research directions

This study is not without limitations and the presented findings should be considered given the empirical context. To begin, this sample of firms is composed of foreign banks in CEE. Focusing on a single industry and geographic region limits the generalisability the study's findings. The reporting requirements in this industry and geographic region yielded access to detailed data on subsidiary executive team composition, executives' backgrounds, and firm characteristics at both the MNC level and the foreign subsidiary level, which enabled this analysis. However, additional

research is needed to determine whether these results are valid in other industries, economies, and geographies. In particular, it would be useful to examine whether these results also hold for emerging market MNCs operating in developed markets. One may expect that when operating in developed markets, emerging market MNCs encounter vastly different supply and demand curves for executive talent than do developed market MNCs operating in developing countries. This warrants further research.

Next, as highlighted earlier, the data included in this study do not represent the universe of potential job candidates, nor have I been able to include all potential hiring firms. The set of counterfactual appointments is therefore incomplete, which may bias the parameter estimates provided by the matching model. I do believe it is reasonable to assume that out-of-sample individuals and banks resemble the entities included in my sample. However, an empirical design characterised by a closed system would provide greater precision to the estimated coefficients.

A meaningful extension of this study would be to use the two-sided matching methodology to examine executive team configuration and executive succession. Like executive selection, executive team configuration and executive succession are also endogenous, non-random processes that are likely to be influenced by unobservable variables. Therefore, using alternative analytical approaches is likely to extend our understanding of the underlying dynamics of these phenomena.

8 Conclusion

Using a unique dataset on subsidiary executive appointments in multinational banks, this study investigates two-sided matching in the international labour market. By employing a competitive assignment model of executive selection and explicitly accounting for the availability of job opportunities and human capital in executives' and firms' choice sets, this study addresses the endogeneity problem underlying the hiring process.

The international research context is characterised by heterogeneous firms with varied human capital needs, allowing for a nuanced examination of the determinants of executive–subsidiary matches along multiple human capital dimensions, with a particular emphasis on firm-specific versus general human capital. The study explores (i) the determinants of executive selection in MNC subsidiaries, (ii) how these determinants shift relative to economic conditions, and (iii) how they differ for two types of functional roles.

The data reveal that for *monitoring roles*, an executive–subsidiary job match is driven by complementarities between (i) MNC size and executive education, (ii) scope of international operations and executive international experience, and (iii) subsidiary acquisition status and executive tenure with the MNC. However, the relative magnitudes of these relationships differ between bullish and bearish economic markets. Most markedly, firm-specific knowledge in the form of executive tenure is more important for executive selection during an economic upswing than during an economic downturn. Conversely, general human capital in the form of education dominates executive selection criteria during an economic downturn.

For *implementation roles*, the matching process appears to be governed by a different set of selection mechanisms, the most dominant being complementary relationships between (i) subsidiary age and executive nationality matching the subsidiary country, and (ii) subsidiary acquisition status and executive tenure with the MNC.

Examining firm-specific human capital and general human capital together enhances our understanding of firm hiring behaviour, and allows us to determine the relative value that firms place on particular types of human capital under different economic conditions. As such, this study contributes to our understanding of the determinants of executive–firm matching, and provides insight into the nuanced relationships between human capital and firm resources.

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References

- Argote, L. and Miron-Spektor, E. (2011) ‘Organizational learning: from experience to knowledge’, *Organization Science*, Vol. 22, pp.1123–1137.
- Bandiera, O., Guiso, L., Prat, A. and Sadun, R. (2015) ‘Matching firms, managers, and incentives’, *Journal of Labor Economics*, Vol. 33, pp.623–681.
- Bartlett, C.A. and Ghoshal, S. (2004) *Transnational Management: Text, Cases and Readings in Cross-border Management*, McGraw-Hill, Boston.
- Bartlett, C.A. and Yoshihara, H. (1988) ‘New challenges for Japanese multinationals: Is organization adaptation their Achilles Heel?’ *Human Resource Management*, Vol. 27, pp.19–43.
- Becker, G. (1964) *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, University of Chicago Press, Chicago.
- Becker, G. (1973) ‘A theory of marriage: Part I’, *Journal of Political Economy*, Vol. 81, pp.813–846.
- Bennett, N. and Miles, S.A. (2006) ‘Second in command: the misunderstood role of the chief operating officer’, *Harvard Business Review*, Vol. 84, pp.71–78.
- Berry, T.K., Bizjak, J.M., Lemmon, M.L. and Naveen, L. (2006) ‘Organizational complexity and CEO labor markets: Evidence from diversified firms’, *Journal of Corporate Finance*, Vol. 12, pp.797–817.
- Black, D.E., Dikolli, S.S. and Dyreng, S.D. (2014) ‘CEO pay-for-complexity and the risk of managerial diversion from multinational diversification’, *Contemporary Accounting Research*, Vol. 31, pp.103–135.

- Buckley, P.J. and Casson, M. (1976) *The Future of the Multinational Enterprise*, Holmes & Meier, London.
- Campbell, B., Coff, R. and Kryscynski, D. (2012) 'Rethinking sustained competitive advantage from human capital', *Academy of Management Review*, Vol. 37.
- Cannella, A.A. and Lubatkin, M. (1993) 'Succession as a sociopolitical process: internal impediments to outsider succession', *Academy of Management Journal*, Vol. 36, pp.763–793.
- Caves, R. (1996) *Multinational Enterprise and Economic Analysis*, Cambridge University Press, New York.
- Chandler, A.D. (1962) *Strategy and Structure*, The MIT Press, Cambridge.
- Chatain, O. and Mindruta, D. (2017) 'Estimating value creation from revealed preferences: application to value-based strategies', *Strategic Management Journal*, Vol. 38, pp.1964–1985.
- Dalton, D.R. and Kesner, I.F. (1985) 'Organizational performance an antecedent of inside/outside chief executive succession: an empirical assessment', *Academy of Management Journal*, Vol. 28, pp.749–762.
- Datta, D.K. and Guthrie, J.P. (1994) 'Executive succession: organizational antecedents and CEO characteristics', *Strategic Management Journal*, Vol. 15, pp.569–577.
- Dobbie, M., Macmillan, C. and Watson, I. (2014) 'The returns to general experience, job and occupational tenure: a study using Australian panel data', *Applied Economics*, Vol. 46, pp.2096–2107.
- Doz, Y.L., Santos, J. and Williamson, P. (2001) *From Global to Metanational: How Companies Win in the Knowledge Economy*, Harvard Business School Press, Boston.
- Drazin, R. and Van De Ven, A. (1985) 'Alternative forms of fit in contingency theory', *Administrative Science Quarterly*, Vol. 30, pp.514–539.
- Edmans, A., Gabaix, X. and Landier, A. (2009) 'A multiplicative model of optimal CEO incentives in market equilibrium', *Review of Financial Studies*, Vol. 22, pp.4881–4917.
- Eisfeldt, A.L. and Kuhnen, C.M. (2013) 'CEO turnover in a competitive assignment framework', *Journal of Financial Economics*, Vol. 109, pp.351–372.
- Fitzsimmons, S.R., Miska, C. and Stahl, G. (2011) 'Multicultural employees: global business' untapped resource', *Organizational Dynamics*, Vol. 40, pp.199–206.
- Fox, J. (2010a) *Estimating matching games with transfers*, Working paper, Chicago: University of Chicago.
- Fox, J. (2010b) 'Identification in matching games', *Quantitative Economics*, Vol. 1, pp.203–254.
- Franko, L. (1973) 'Who manages multinational enterprises?' *Columbia Journal of World Business*, Vol. 8, pp.30–42.

- Gabaix, X. and Landier, A. (2008) 'Why has CEO compensation increased so much?' *Quarterly Journal of Economics*, Vol. 123, pp.49–100.
- Gathmann, C. and Schonberg, U. (2010) 'How general is human capital? A task-based approach', *Journal of Labor Economics*, Vol. 28, pp.1–49.
- Gong, Y. (2003) 'Subsidiary staffing in multinational enterprises: agency, resources, and performance', *Academy of Management Journal*, Vol. 46, pp.728–738.
- Greve, P., Nielsen, S. and Ruigrok, W. (2009) 'Transcending borders with international top management teams: a study of European financial multinational corporations', *European Management Journal*, Vol. 27, pp.213–224.
- Guthrie, J.P. and Datta, D.K. (1998) 'Corporate strategy, executive selection and firm performance', *Human Resource Management*, Vol. 37, pp.101–115.
- Hambrick, D.C. and Cannella, A.A. (2004) 'CEOs who have COOs: contingency analysis of an unexplored structural form', *Strategic Management Journal*, Vol. 25, pp.959–979.
- Hambrick, D.C. and Mason, P.A. (1984) 'Upper echelons: the organization as a reflection of its top managers', *The Academy of Management Review*, Vol. 9, pp.193–206.
- Hymer, S.H. (1976) *The International Operations of National Firms: A Study of Direct Foreign Investment* Cambridge, MIT Press.
- Jenter, D. and Kanaan, F. (2015) 'CEO turnover and relative performance evaluation', *The Journal of Finance*, Vol. 70, pp.2155–2183.
- Johnson, K.L. and Duxbury, L. (2010) 'The view from the field: a case study of the expatriate boundary-spanning role', *Journal of World Business*, Vol. 45, pp.29–40.
- Jovanovic, B. (1979) 'Job matching and the theory of turnover', *Journal of Political Economy*, Vol. 87, pp.972–990.
- Kogut, B. (1989) 'A note on global strategies', *Strategic Management Journal*, Vol. 10, pp.383–389.
- Kogut, B. and Zander, U. (1993) 'Knowledge of the firm and the evolutionary theory of the multinational corporation', *Journal of International Business Studies*, Vol. 24, pp.625–645.
- Lam, S. and Yeung, J. (2010) 'Staff localization and environmental uncertainty on firm performance in China', *Asia Pacific Journal of Management*, Vol. 27, pp.677–695.
- Lawrence, P.R. and Lorsch, J.W. (1967) *Organization and Environment: Managing Differentiation and Integration*, Harvard Business School Press, Boston.
- Lazear, E.P. (2009) 'Firm-specific human capital: a skill-weights approach', *Journal of Political Economy*, Vol. 117, pp.914–940.
- Lazear, E.P. and Oyer, P. (2004) 'Internal and external labor markets: a personnel economics approach', *Labour Economics*, Vol. 11, pp.527–554.

- Lazear, E.P. and Oyer, P. (2012) 'Personnel economics', in Gibbons, R. and Roberts, J. (Eds): *The Handbook of Organizational Economics*, Princeton University Press, Princeton, NJ.
- Lyles, M.A. and Salk, J.E. (1996) 'Knowledge acquisition from foreign parents in international joint ventures: an empirical examination in the Hungarian context', *Journal of International Business Studies*, Vol. 27, pp.877–903.
- Mackey, A., Molloy, J.C. and Morris, S.S. (2014) 'Scarce human capital in managerial labor markets', *Journal of Management*, Vol. 40, pp.399–421.
- Manski, C.F. (1975) 'Maximum score estimation of the stochastic utility model of choice', *Journal of Econometrics*, Vol. 33, pp.205–228.
- Menz, M. (2012) 'Functional top management team members: a review, synthesis, and research agenda', *Journal of Management*, Vol. 38, pp.45–80.
- Milgrom, P. and Roberts, J. (1995) 'Complementarities and fit: strategy, structure, and organizational change in manufacturing', *Journal of Accounting and Economics*, Vol. 19, pp.179–208.
- Mindruta, D. (2013) 'Value creation in university-firm research collaborations: a matching approach', *Strategic Management Journal*, Vol. 34, pp.644–665.
- Mindruta, D., Moeen, M. and Agarwal, R. (2016) 'A two-sided matching approach for partner selection and assessing complementarities in partners' attributes in inter-firm alliances', *Strategic Management Journal*, Vol. 37, pp.206–231.
- Mortensen, D. (1988) 'Matching: Finding a partner for life or otherwise', *American Journal of Sociology*, Vol. 94, pp.215–240.
- Nawakitphaitoon, K. (2014) 'Occupational human capital and wages: the role of skills transferability across occupations', *Journal of Labor Research*, Vol. 35, pp.63–87.
- Neal, D. (1995) 'Industry-specific human capital: evidence from displaced workers', *Journal of Labor Economics*, Vol. 13, pp.653–677.
- Ocasio, W. (1999) 'Institutionalized action and corporate governance: the reliance on rules of CEO succession', *Administrative Science Quarterly*, Vol. 44, pp.384–416.
- Pan, Y. (2017) 'The determinants and impact of executive-firm matches', *Management Science*, Vol. 63, pp.185–200.
- Parent, D. (2000) 'Industry-specific capital and the wage profile: evidence from the national longitudinal survey of youth and the panel study of income dynamics', *Journal of Labor Economics*, Vol. 18, pp.306–323.
- Prahalad, C.K. and Doz, Y.L. (1981) 'An approach to strategic control in MNCs', *Sloan Management Review*, Vol. 22, pp.5–13.
- Rose, N. and Shepard, A. (1997) 'Firm diversification and CEO compensation: managerial ability or executive entrenchment', *The RAND Journal of Economics*, Vol. 28, pp.489–514.

- Rosen, S. (1982) 'Authority, control, and the distribution of earnings', *The RAND Journal of Economics*, Vol. 13, pp.311–323.
- Ryan, J.C. (2017) 'Reflections on the conceptualization and operationalization of a set-theoretic approach to employee motivation and performance research', *Journal of Innovation & Knowledge*, Vol. 2, pp.45–47.
- Schoonhoven, C.B. (1981) 'Problems with contingency theory: testing assumptions hidden within the language of contingency "theory"', *Administrative Science Quarterly*, Vol. 26, pp.349–377.
- Shapley, L.S. and Shubik, M. (1971) 'The assignment game I: the core', *International Journal of Game Theory*, Vol. 1, pp.111–130.
- Sorensen, M. (2007) 'How smart is smart money? A two-sided matching model of venture capital', *Journal of Finance*, Vol. 62, pp.2725–2762.
- Storn, R. and Price, K. (1997) 'Differential evolution – a simple and efficient heuristic for global optimization over continuous spaces', *Journal of Global Optimization*, Vol. 11, pp.341–359.
- Sullivan, P. (2010) 'Empirical evidence on occupation and industry specific human capital', *Labour Economics*, Vol. 17, pp.567–580.
- Teece, D.J. (1981) 'The multinational enterprise: market failure and market power considerations', *Sloan Management Review*, Vol. 22, pp.3–17.
- Tervio, M. (2008) 'The difference that CEOs make: an assignment model approach', *American Economic Review*, Vol. 98, pp.642–668.
- Torres, P. and Augusto, M. (2017) 'The impact of experiential learning on managers' strategic competencies and decision style', *Journal of Innovation & Knowledge*, Vol. 2, pp.10–14.
- Tung, R. (1982) 'Selection and training procedures of U.S., European and Japanese multinationals', *California Management Review*, Vol. 25, pp.57–72.
- Tung, R. (1987) 'Enhancing success and managing failure', *Academy of Management Executive*, Vol. 1, pp.117–126.
- Venkatraman, N. (1989) 'The concept of fit in strategy research: toward verbal and statistical correspondence', *The Academy of Management Review*, Vol. 14, pp.423–444.
- Wang, P., Tong, T.W. and Koh, C.P. (2004) 'An integrated model of knowledge transfer from MNC parent to China subsidiary', *Journal of World Business*, Vol. 39, pp.168–182.
- Yagi, N. and Kleinberg, J. (2011) 'Boundary work: an interpretive ethnographic perspective on negotiating and leveraging cross-cultural identity', *Journal of International Business Studies*, Vol. 42, pp.629–653.
- Yang, Y., Shi, M. and Goldfarb, A. (2009) 'Estimating the value of brand alliances in professional team sports', *Marketing Science*, Vol. 28, pp.1095–1111.